

What is claimed is:

1. A pattern measurement method comprising:
 - acquiring graphic data of a plurality of patterns including image data;
 - processing the graphic data to detect a coordinate of an edge point of the pattern;
 - combining the edge points between the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points;
 - and
 - evaluating at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the prepared distance angle distribution map.

2. The pattern measurement method according to claim 1, wherein said evaluating includes extracting a characteristic point of the distance angle distribution map; and
 - at least one of the relation of shape between the patterns, the relation of size between the patterns, and the relative location between the patterns is evaluated on the basis of the extracted characteristic point.

3. The pattern measurement method according to claim 1, wherein said evaluating comprises calculating a dimension between specific portions of the patterns as an amount representing at least one of the relation of shape between the patterns, the relation of size between the patterns, and the relative location between the patterns.

4. The pattern measurement method according to claim 2, wherein the plurality of patterns include a measurement target pattern, and a standard pattern which is an evaluation standard of the measurement target pattern,

the distance angle distribution map is prepared for each of a plurality of sets of patterns, one set of patterns being constituted of a plurality of patterns including a common standard pattern, and

said evaluating includes evaluating at least one of the relation of shape between the standard pattern and the measurement target pattern in each set, the relation of size between the standard pattern and the measurement target pattern in each set, and the relative location between the standard pattern and the measurement target pattern in each set on the basis of the characteristic point extracted from the plurality of prepared distance angle distribution maps.

5. The pattern measurement method according to claim 1, wherein the plurality of patterns include a measurement target pattern, and a standard pattern which is an evaluation standard of the measurement target pattern,

the distance angle distribution map is prepared for each of a plurality of sets of patterns, one set of patterns being constituted of a plurality of patterns including a common standard pattern, and

said evaluating comprises: performing a calculation process between distribution regions in the prepared distance angle distribution map to calculate a characteristic amount of the distance angle distribution map; and evaluating at least one of the relation of shape between the standard pattern and the measurement target pattern in each set, the relation of size between the standard pattern and the measurement target pattern in each set, and the relative location between the standard pattern and the measurement target pattern in each set on the basis of the calculated characteristic amount.

6. A pattern measurement method comprising:

acquiring graphic data of a plurality of patterns including image data;

processing the graphic data to detect a coordinate of an edge point of the pattern;

combining the edge points of the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points for each pattern; and

extracting a characteristic point of the distance angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the extracted characteristic point.

7. A pattern measurement method comprising:

acquiring graphic data of a plurality of patterns including image data;

processing the graphic data to detect a coordinate of an edge point of the pattern;

combining the edge points of the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points for each pattern; and

calculating a characteristic amount of the distance

angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the calculated characteristic amount.

8. The pattern measurement method according to claim 7, wherein the plurality of patterns include a measurement target pattern constituting a target of measurement, and

the pattern measurement method further comprises selecting and setting a standard pattern constituting an evaluation standard of the measurement target pattern from the plurality of patterns.

9. The pattern measurement method according to claim 8, wherein the image data includes image data obtained with respect to the pattern of a non-defective, and the pattern of the non-defective is set as the standard pattern.

10. The pattern measurement method according to claim 8, wherein the plurality of patterns include a measurement target pattern, and a standard pattern constituting an evaluation standard of the measurement target pattern, and

graphic data of the standard pattern is beforehand prepared prior to acquisition of the graphic data of the measurement target pattern.

11. The pattern measurement method according to claim 7, wherein said evaluating includes calculating an amount representing a difference in the shape between the patterns as the relation of shape between the patterns on the basis of the characteristic amount.

12. The pattern measurement method according to claim 7, wherein the graphic data of the standard pattern is CAD data or data of a simulation calculation result.
13. A manufacturing method of a semiconductor device using a pattern measurement method comprising:
acquiring graphic data of a plurality of patterns including image data;
processing the graphic data to detect a coordinate of an edge point of the pattern;
combining the edge points between the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points;
and
evaluating at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the prepared distance angle distribution map.
14. A manufacturing method of a semiconductor device using a pattern measurement method comprising:
acquiring graphic data of a plurality of patterns including image data;
processing the graphic data to detect a coordinate of an edge point of the pattern;
combining the edge points of the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance

angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points for each pattern; and

extracting a characteristic point of the distance angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the extracted characteristic point.

15. A manufacturing method of a semiconductor device using a pattern measurement method comprising:

acquiring graphic data of a plurality of patterns including image data;

processing the graphic data to detect a coordinate of an edge point of the pattern;

combining the edge points of the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points for each pattern; and

calculating a characteristic amount of the distance angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the calculated characteristic amount.

16. A program which allows a computer to execute a pattern measurement method, said pattern measurement method comprising:

acquiring graphic data of a plurality of patterns including image data;

processing the graphic data to detect a coordinate of an edge point of the pattern;

combining the edge points between the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points; and

evaluating at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the prepared distance angle distribution map.

17. A program which allows a computer to execute a pattern measurement method, said pattern measurement method comprising:

acquiring graphic data of a plurality of patterns including image data;

processing the graphic data to detect a coordinate of an edge point of the pattern;

combining the edge points of the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points for each pattern; and

extracting a characteristic point of the distance angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the

patterns on the basis of the extracted characteristic point.

18. A program which allows a computer to execute a pattern measurement method, said pattern measurement method comprising:

acquiring graphic data of a plurality of patterns including image data;

processing the graphic data to detect a coordinate of an edge point of the pattern;

combining the edge points of the patterns to make a pair of edge points and calculating a distance between the edge points constituting each pair of edge points and an angle between a straight line which connects the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distance angle distribution map which is a distribution map of the calculated distance and angle of the pair of edge points for each pattern; and

calculating a characteristic amount of the distance angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the calculated characteristic amount.

19. A pattern measurement apparatus comprising:

an edge point detector which receives graphic data of a plurality of patterns including image data and processes the graphic data to detect a coordinate of an edge point of the pattern;

a distance angle distribution map preparer which combines the edge points between the patterns to make a pair of edge points and calculates a distance between the edge points constituting each pair of edge points and an angle between a straight line to connect the edge point to the other edge point and an arbitrary axial line with respect to

each pair of edge points to prepare a distribution map of the calculated distance and angle of the pair of edge points as a distance angle distribution map; and

an evaluator which evaluates at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the prepared distance angle distribution map.

20. The pattern measurement apparatus according to claim 19,

wherein the evaluator extracts a characteristic point of the distance angle distribution map, and evaluates at least one of the relation of shape between the patterns, the relation of size between the patterns, and the relative location between the patterns on the basis of the extracted characteristic point.

21. The pattern measurement apparatus according to claim 19,

wherein the evaluator calculates a dimension between specific portions of the patterns as an amount representing at least one of the relation of shape between the patterns, the relation of size between the patterns, and the relative location between the patterns.

22. The pattern measurement apparatus according to claim 20,

wherein the plurality of patterns include a measurement target pattern, and a standard pattern which is an evaluation standard of the measurement target pattern,

the distance angle distribution map preparer prepares the distance angle distribution map for each of a plurality of sets of patterns, each set of patterns being constituted of a plurality of patterns including a common standard pattern, and

the evaluator evaluates at least one of the relation of shape between the standard pattern and the measurement target pattern in each set, the relation of size between the standard pattern and the measurement target pattern in each set, and the relative location between the standard pattern and the measurement target pattern in each set on the basis of the characteristic point extracted from the plurality of prepared distance angle distribution maps.

23. The pattern measurement apparatus according to claim 19,

wherein the plurality of patterns include a measurement target pattern, and a standard pattern which is an evaluation standard of the measurement target pattern,

the distance angle distribution map preparer prepares the distance angle distribution map for each of a plurality of sets of patterns, each set of patterns being constituted of a plurality of patterns including a common standard pattern, and

the evaluator performs a calculation process between distribution regions in the prepared distance angle distribution map to calculate a characteristic amount of the distance angle distribution map, and evaluates at least one of the relation of shape between the standard pattern and the measurement target pattern in each set, the relation of size between the standard pattern and the measurement target pattern in each set, and the relative location between the standard pattern and the measurement target pattern in each set on the basis of the calculated characteristic amount.

24. A pattern measurement apparatus comprising:

an edge point detector which receives graphic data of a plurality of patterns including image data and processes the graphic data to detect a coordinate of an edge point of the pattern;

a distance angle distribution map preparer which

combines the edge points of the patterns to make a pair of edge points and calculates a distance between the edge points constituting each pair of edge points and an angle between a straight line to connect the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distribution map of the calculated distance and angle of the pair of edge points as a distance angle distribution map for each pattern; and

an evaluator which extracts a characteristic point of the distance angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the extracted characteristic point.

25. The pattern measurement apparatus according to claim 24,

wherein the evaluator calculates an amount representing a difference in the shape between the patterns as the relation of shape between the patterns on the basis of the characteristic point.

26. The pattern measurement apparatus according to claim 25,

wherein the graphic data of the standard pattern is CAD data or data of a simulation calculation result.

27. A pattern measurement apparatus comprising:

an edge point detector which receives graphic data of a plurality of patterns including image data and processes the graphic data to detect a coordinate of an edge point of the pattern;

a distance angle distribution map preparer which combines the edge points of the patterns to make a pair of edge points and calculates a distance between the edge points constituting each pair of edge points and an angle

between a straight line to connect the edge point to the other edge point and an arbitrary axial line with respect to each pair of edge points to prepare a distribution map of the calculated distance and angle of the pair of edge points as a distance angle distribution map for each pattern; and

an evaluator which calculates a characteristic amount of the distance angle distribution map to evaluate at least one of a relation of shape between the patterns, a relation of size between the patterns, and a relative location between the patterns on the basis of the calculated characteristic amount.

28. The pattern measurement apparatus according to claim 27,

wherein the plurality of patterns include a measurement target pattern constituting a target of measurement, and

the pattern measurement apparatus further comprises a standard pattern setter which selects and sets a standard pattern constituting an evaluation standard of the measurement target pattern from the plurality of patterns.

29. The pattern measurement apparatus according to claim 28,

wherein the image data includes image data obtained with respect to the pattern of a non-defective, and

the pattern of the non-defective is set as the standard pattern.

30. The pattern measurement apparatus according to claim 27,

wherein the plurality of patterns include a measurement target pattern, and a standard pattern constituting an evaluation standard of the measurement target pattern, and

graphic data of the standard pattern is beforehand